Development of High-efficient Seawater Desalination Process

utilizing nanofiltration and reverse osmosis membranes

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Summary

It is an urgent matter in seawater desalination process to lower the cost for producing potable water. In this report, as one of the solution, a novel hot seawater desalination process is proposed and the advantages of the process are discussed. The performance of a reverse osmosis membrane used with hot seawater is evaluated using a polarization model and non-equilibrium permeation theory. It is found that the permeance becomes twice that observed in a conventional process, which means that the needed membrane area will be less than half. The energy consumption in the membrane module is also estimated. The needed energy excluding the energy for warming the feed is about 60% of that needed for a conventional process. The model simulation result of utilizing waste energy from a garbage furnace is also presented. The amount of waste energy from garbage in the city of 1 million populations is enough to produce about 11% potable water of that needed for people in the city. Our proposed process is found to be advantageous economically as well as in terms of the sizes of membrane modules.